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de Gruijter, M.

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CHAPTER 6

THE USE OF RAPID IDENTIFICATION INFORMATION AT THE CRIME SCENE; SIMILARITIES AND DIFFERENCES BETWEEN ENGLISH AND DUTCH CSIs

ABSTRACT¹

This study replicates previous research that investigated the influence of rapid identification information on the interpretation of a crime scene conducted with English crime scene investigators (CSIs). Given the special circumstances under which CSIs in one country operate, the present study investigates the robustness and generalizability of the previous findings by studying whether identical decision making phenomena are found in a replication study within a different police environment. Dutch CSIs (N=65) participated in exactly the same study and the results are compared with the English findings. The utility of the replication study is reflected in both the revealed robustness and differences in the findings. First, the results demonstrate the robustness of the previous finding that ID information influenced the interpretation of the crime scene, even more when this information was provided after CSIs had constructed a provisional scenario. Secondly, this study revealed differences in decision making: English CSIs used ID information to make efficient decisions by prioritizing traces with direct investigative opportunities and disregarding those without direct opportunities, which led to a form of tunnel vision, namely the ignorance of the involvement of a second offender. Dutch CSIs showed to be less prone to bias towards traces that produced database-matches. Dutch CSIs seemed to be more focussed on the relation of the trace with the crime, while English CSIs are more focussed on the database-match. Consequently, important information was overlooked. We question whether the emphasis on efficiency in England goes at the expense of the quality of an investigation.

¹ A slightly different version of this chapter was submitted as De Gruijter, M., & De Poot, C.J. The use of rapid identification information at the crime scene; similarities and differences between English and Dutch CSIs.

6.1 Introduction

In the near future, new technologies will make it possible for crime scene investigators (CSIs) to reconstruct a crime based on rapid identification information that will be received during the crime scene investigation itself (Butler, 2015; Jovanovich et al., 2015; Kurpershoek, 2009). Traces found at the crime scene can be analysed with mobile identification technology and compared with a database in a short amount of time. These technologies will help making fast decisions and could contribute to the rapid development of lines of inquiry as identification (ID) information can quickly lead to suspects. A previous study of De Gruijter, Nee, & De Poot (2017) investigating the use of ID information at the crime scene with English CSIs has shown that ID information influenced the interpretation of the crime scene, even more when this information was provided after CSIs had constructed a provisional scenario (i.e. narratives that explain the observed traces at the crime scene). CSIs who received ID information constructed different scenarios compared to CSIs who did not receive this ID information (De Gruijter et al., 2017). Furthermore, this study demonstrated that English CSIs used ID information to make efficient decisions by prioritizing traces with direct investigative opportunities and disregarding those without direct investigative opportunities. This may contribute to rapid case processing, but selective attention and premature closure (i.e. focussing on only those traces with direct investigative opportunities) may also lead to bias in the investigation as decisions are reached before all available alternatives have been considered (Findley & Scott, 2006; Nickerson, 1998).

Bearing in mind that selective attention and premature closure within criminal investigations have been demonstrated in multiple studies (Ask & Granhag, 2005; Dror, Peron, Hind, & Charlton, 2005; Eerland & Rassin, 2012; O'Brien, 2009), the results in the previous study are not surprising. However, given the special circumstances in which English CSIs work, we wonder whether these results may be partly guided by these circumstances, and thus only hold in that context. CSIs in one country share a particular police culture because of similar trainings and working environments (Nickels & Verma, 2008). The question arises whether similar results would be found if CSIs in a different environment, for example Dutch CSIs, are studied. England and the Netherlands are rather different when it comes to their criminal justice system and police culture. The English police operate within an adversarial justice system, whereas the Dutch police is embedded within an inquisitorial justice system (Creaton & Pakes, 2013; Komter & Malsch, 2012) and efficiency seems to play a larger role within the English police compared to the Dutch police where thoroughness seems to be more important than efficiency (Groenendaal & Helsloot, 2014; De Maillard & Savage, 2016; Winsor, 2016).

Research has shown that responses of people are under control of goals and that goals can influence cognitive processes (Moskowitz & Grant, 2009). Common goals of a police organization may contribute to different investigative decision-making strategies. Moreover, Granhag, Rebelius, & Ask (2011) have demonstrated that efficiency goals can reduce investigators' processing depth. The way English CSIs prioritized traces linked with a database match in the study of De Gruijter et al., (2017) may have been influenced by efficiency goals of the English police. The present study therefore investigates whether English and Dutch CSIs have different goals and tests the robustness and generalisability of the previous findings by studying whether identical decision making phenomena are found in a replication study with Dutch CSIs. The main focus will be on the comparison of the finding regarding trace valuation, however, the finding showing the influence of ID information on the interpretation of the crime scene will also be tested. We will first elaborate on the policing cultures of England and The Netherlands and their associated goals.

6.1.1 Focus during a police investigation

Police investigations, in general, take place in complex settings. Detectives operate in an uncertain environment with information overload, time pressure and limited resources. Generally, people use heuristics (mental strategies to deal with complex and uncertain contexts) to make decisions in complex situations (Gigerenzer & Brighton, 2009; Gigerenzer, Todd, & ABC Research Group, 1999). For example, heuristics allow us to focus on relevant information and ignore irrelevant information when confronted with information overload. During police investigations, a lot of information becomes available that may or may not be related with the crime that is under investigation. In order to make the investigation controllable a focus in the investigation is necessary (Liedenbaum, De Poot, Van Straalen, & Kouwenberg, 2015; Snook & Cullen, 2008). It guides the search for information and helps deciding on fruitful lines of inquiry. Moreover, not everything can be investigated due to limited resources and time pressure under which the police need to operate and the chance of finding the offender decreases after 24 hours (De Poot, Bokhorst, Van Koppen, & Muller, 2004). So, a form of efficiency, or focus, is necessary to conduct an investigation and find the perpetrator within a reasonable period of time with the available resources. The English CSIs in the study of De Gruijter and colleagues (2017) used ID information efficiently by focussing on traces linked with a database match,

Although the use of heuristics mostly contributes to fast and efficient decision making, it also entails risks when important information is overlooked and this focus leads to tunnel vision. An example of this pitfall was demonstrated in the study of De Gruijter and

colleagues as the CSIs considered the traces without a match with the database less important and as a consequence ignored the possibility of a second offender. Especially in police investigations, where people can become a suspect, the use of heuristics can have major consequences when objectivity is lost (Rossmo, 2008). Detectives can become too convinced of one theory with the consequence that important information directing to another theory with a different suspect is ignored and the search for evidence is only focussed on confirmation of one theory. Several miscarriages of justice in both the Netherlands and England have shown the possible negative consequences of tunnel vision during an investigation (e.g. Guildford four, Birmingham Six, Schiedammer park murder, Puttense murder).

6.1.1.1 Precautions taken to prevent tunnel vision

Tunnel vision is a well-known concept both within the English and Dutch criminal justice system and has been recognised as a risk factor in investigations. Within England, miscarriages of justice have received a lot of publicity since the early 1980s (Jones, Grieve, & Milne, 2008). After the Byford inquiry of the Yorkshire Ripper murders, where important leads were not followed up while persisting with false leads (Byford, 1982), and the MacPherson report in 1999, multiple recommendations have been implemented within the investigations of murder cases to prevent biased decision making (ACPO, 2006; Jones et al., 2008). Fahsing & Ask (2016) discuss the positive influence of the Professionalising Investigation Programme (PIP), which is implemented in England to improve police investigations, on detectives' decision making. Also, the Forensic Science Regulator has produced guidance to show readers how to recognise cognitive bias within the forensic field (Forensic Science Regulator, 2015).

Within the criminal justice system of the Netherlands, there is also attention for the risks of bias and more specifically to the prevention of tunnel vision. In 2005 the Dutch police, the Public Prosecution Service and the Netherlands Forensic Institute launched a program to strengthen the investigation and prosecution in which the prevention of tunnel vision played a large role (Openbaar Ministerie, Politie & NFI, 2005). Part of the measures is aimed at countering tunnel vision in the investigation process, such as identifying alternative scenarios, monitoring decisions taken in the investigation process and organising reflection.

The measures taken to protect against tunnel vision means that some work processes may be set up less efficiently, e.g. more protocolled, to avoid the risks of bias (Groenendaal & Helsloot, 2014). In order to be able to manage police investigations with proper prevention of bias, there should be an optimal balance between efficiency to come to the correct scenario as quickly as possible and thoroughness and accuracy to

ensure all possible theories are investigated. Efficiency can solve a case quickly, but could also pave the way for bias if other options are not carefully investigated.

6.1.2 Performance management

Compared to the Netherlands, England appears to have a higher emphasis on performance management in which effectiveness and efficiency play a large role (Cockcroft & Beattie, 2009; De Maillard & Savage, 2016). Both the English and Dutch police have targets predetermined by policymakers they have to achieve (Ministerie van Veiligheid en Justitie, 2015; Winsor, 2016), but this seems to be more controlled in England. In England, there is a transparent accountability for the way money is spent within the police force. All police forces are inspected on, among other things, the effectiveness of the force at investigating crime, e.g. number of solved crimes, and managing offenders and the ability of the forces to use their resources in a way it meets their demand. An emphasis on efficiency and effectiveness within a competitive context could trigger efficiency goals with a focus on quick arrests of suspects as this leads to higher arrests rates and hence could encourage selective attention to make fast decisions. However, it could also lead to bias when other options are ignored. An emphasis on efficiency and effectiveness may have contributed to the finding demonstrated in the study of De Gruijter et al. (2017) where English CSIs showed a preference for traces showing a database match and did not think of a second offender at the first stage of their investigation. The efficiency minded policing model maintained in England is also reflected in the size of their DNA-database, which was designed to encourage cost-effective policing (Williams, Johnson, & Martin, 2004).² Although legislation has been reformed after the Protection of Freedoms Act in 2012, in 2017, approximately 8.0% of the total population of England and Wales was included in the database (Home Office, 2017; Office for National Statistics, 2017).

In the Netherlands, there is less transparency with regard to the performance of the different forces. Groenendaal & Helsloot (2014) believe that the large focus on preventing tunnel vision in the Netherlands creates a polarity between efforts to increase numbers of solved crimes (called efficiency) and minimization of the chance of wrongful convictions (called precaution). They do not believe that judicial flaws should be prevented whatever the costs, as this would mean fewer criminals would be caught and prosecuted. They argue that the measures taken to prevent tunnel vision have lessened the efficiency of the criminal investigation process in The Netherlands (Groenendaal & Helsloot, 2014).

² For legislation for the UK databases see <https://www.gov.uk/government/publications/protection-of-freedoms-act-2012-dna-and-fingerprint-provisions/protection-of-freedoms-act-2012-how-dna-and-fingerprint-evidence-is-protected-in-law>.

Furthermore, the Dutch DNA database holds a much smaller sample of the population, a percentage of approximately 1.5% in 2017 (Centraal Bureau voor de Statistiek, 2017; NFI, 2017). Considering this, Dutch CSIs may be triggered by thoroughness as a goal, and consequently act more careful in their decision making compared to English CSIs who may act faster and more database oriented. A study conducted with Dutch CSIs having access to rapid identification technologies has shown that CSIs displayed a preference for analysing assumed perpetrator traces and paid less attention to traces assumed to be left by the victim (De Gruijter, De Poot, & Elffers, 2016b). It is still unknown how they would value traces with matches and non-matches.

6.1.3 The present study

Although the observed influence of database-matches on the perceived importance of traces could be a common strategy, the efficiency based police policy in which English CSIs operate may have contributed to their decision making. The traces providing an identification with an individual in the database hold direct investigative opportunities as they provide a name of a possible suspect. We wonder whether Dutch CSIs would make similar decisions and we therefore test the generalizability of the results within a different police environment and different goal triggers. We will compare CSI decision making regarding the interpretation of identification information across English and Dutch CSIs by investigating (1) whether English and Dutch CSIs differ in the perceived aim of a crime scene investigation, (2) the robustness of the observed influence of ID information on the interpretation of the crime scene within the two different police environments and (3) the robustness of the observed effect showing that traces with a database-match are valued higher compared to similar traces without a database-match within the two different police environments. We will test these questions by replicating the previous study with Dutch CSIs and compare the results between the English and Dutch CSIs.

6.1.3.1 Hypotheses

We hypothesize that (1) English and Dutch CSIs have different goals, (2) that English and Dutch CSIs show similar behaviour in the construction of scenarios. The ID information will lead to different scenarios and ID information will have a higher influence on scenario construction when provided after a scenario has been constructed, and (3) we hypothesize that Dutch CSIs will be less influenced by database matches when they rate traces.

6.2 Method

The present study, conducted with Dutch CSIs, is a replication of the study of De Gruijter et al. (2017) and the method and data-collection among Dutch CSIs is identical to the one described in the earlier paper among English officers. For clarity's sake, however, we reiterate a description of the experimental set-up. The main purpose of the previous paper was to study the influence of the timing of ID information on scenario formation and the influence of database-matches on the valuation of traces, in the English context. Here we will again explain the design used to answer those two questions and added a third factor: the comparison between England and The Netherlands.

6.2.1 Scenarios

The crime scenarios in our study are based on a real crime case where two scenarios were most obvious during the actual police investigation. The scenarios for this study were constructed in collaboration with crime scene investigators. The scene was intentionally set up in an ambiguous way in order to thoroughly examine the research question regarding the influence of ID information on the interpretation of the scene. There were two possible main scenarios of which an aggravated burglary scenario was the ground truth. As this is one of the first studies on CSI decision making we decided to keep the range of possible scenarios limited.

6.2.1.1 *The ground truth – burglary scenario.* Two burglars, Ayden Roberts and John Campbell, killed a woman named Valerie by strangulation during a break in at her house. Valerie and her husband Steve got into a heated argument earlier that morning after Valerie admitted she was having an affair. Both of them left the house after the fight. In the meantime, the burglars entered their house. Valerie caught the burglars red handed when she came home. Ayden and John panicked and Valerie was strangled. Steve came home and found Valerie and called an ambulance. She was brought to the hospital where she died in intensive care. Police colleagues at the hospital told the police that Valerie had unusual red marks on her neck. This story is the ground truth in our study.

6.2.1.2 *Alternative scenario – domestic homicide.* The start of this alternative story is similar as the ground truth. Steve and Valerie had a heated argument in the morning and both of them left after the fight. Valerie came home first, followed by Steve. He strangled Valerie in a rage. Afterwards, he staged a burglary by opening the drawers and cupboards and called the ambulance.

6.2.2 Traces left at the scene and information provided to participants

In designing the crime scene, it was clear that as a result of both the fight in the morning and the burglary in the afternoon, the crime scene needed to show a mess in the living room. During the burglary, both Ayden and John left traces at the crime scene and obviously, Steve and Valerie's traces were present in the house as they were the residents.

It was suggested to participants that twelve traces or items from the scene were analysed with rapid identification technologies, and results became available at different points in time for the handling CSIs. Table 6.1 shows the items that returned a match with either one of the burglars or with the residents Steve and Valerie. Participants received the results of these traces. The information that these traces provided suggested a scenario with the potential involvement of two other persons (in effect Ayden and John), but this ID information also fit the alternative domestic murder scenario as the traces left by the burglars are not strongly crime related and could be interpreted as being left during another occasion.

Table 6.1: traces that were left by the burglars (John and Ayden), Steve or Valerie.

Trace	Match with	Trace	Match with
<i>Beer can outside the house</i>	Ayden	<i>Cigarette butt outside the house</i>	John
<i>Outside post flap front door</i>	Ayden	<i>Outside of the window of living room</i>	John
<i>Shoulder bag inside the house (potential murder weapon)</i>	Ayden + Steve + Valerie	<i>Scarf inside the house (potential murder weapon)</i>	John + Steve + Valerie
<i>Glass on table</i>	Valerie	<i>Knife in the kitchen</i>	Steve
<i>Coffee cup on table</i>	Steve	<i>Blood sample tissue</i>	Steve
<i>Pieces of glass vase on floor</i>	Valerie	<i>Cigarette butts ashtray</i>	Valerie & Steve

Participants also received preliminary findings from the detectives and forensic colleagues in the investigation, including information about the way the victim was found, a witness statement from Steve, from the neighbour and from a friend of Valerie and a friend of Steve. The witness statements are called investigative information and suggested the involvement of Steve (i.e. domestic murder scenario).

6.2.3 The crime scene

We created an ambiguous crime scene that matched the burglary scenario as well as the domestic homicide scenario. The crime scene was created in one of the houses of the Dutch police academy in the Netherlands in collaboration with Dutch expert crime scene

investigators. The crime scene was based on a real case ensuring that traces were left at realistic places. In order to be able to collect enough data we photographed the crime scene with a panoramic camera which produced a 3D computer coverage of the scene. In this way, participants did not have to be physically present at the scene but could investigate it from behind the computer. They could navigate through the scene and zoom in and out. In addition, participants were provided more detailed photographs of the scene on paper. Figure 6.1 shows photos of the scene and the outlook of the panoramic scene on the computer.

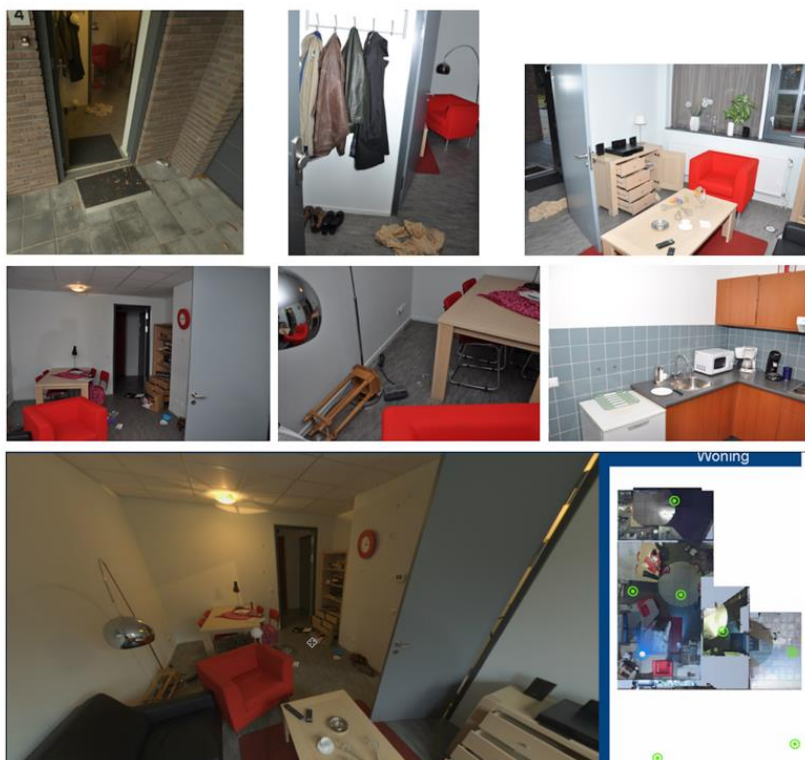


Figure 6.1: photos of the scene of the crime. The bottom photo on the left shows the outlook of the scene on the computer, the picture on the bottom right shows the plan of the house from a view from above. The green dots can be clicked on to view the house from another angle.

6.2.4 Design

The experiment comprised a 2 (*rapid ID information*: before scenario construction; after scenario construction) x 2 (*database match*: with known person on set of traces 1, no match on set 2; with known person on set of traces 2, no match on set 1) x 2 (*country*:

England; The Netherlands) between participants design.³ In order to answer the research questions, conditions were manipulated as described below.

6.2.4.1 Q1: How is scenario formation influenced by the moment that ID information is provided?

Factor I: Moment that Rapid ID info becomes available.

At the start of the investigation all participants received identical investigative information and the virtual crime scene and were asked what was according to them the most likely scenario after appraising the evidence up to that stage. In order to test whether scenario formation was influenced by the moment that ID information was provided, half of the participants were given ID information at the start of their investigation, *before* they constructed a scenario (group Early ID). These participants received analysis results of twelve pre-selected traces. They were told that these traces were analysed with rapid identification technologies and obtained profiles were searched against the National DNA database (NDNAD) and obtained fingerprints were searched against the database for fingerprints (IDENT1). They were therefore able to use the information in their scenario formation. The other half of the participants received the identical ID information *after* they had written a provisional scenario and further investigated the scene (group Late ID). Hence, they had to write a scenario without the ID information. After these participants received the ID information they were offered the possibility to adjust their scenario. Participants were randomly assigned to one of the two conditions.

6.2.4.2 Q2: do database-matches influence the valuation of traces and the reconstruction of the crime?

Factor II: database- matches returning a known or an unknown person.

In order to study whether the type of database-matches influence the valuation of traces and the reconstruction of the crime, traces that provided a match with NDNAD or IDENT1 were manipulated. In the ground truth, two persons committed the crime and left similar traces at the scene: Ayden Roberts and John Campbell. We divided the participants into two groups, A: Ayden known/John unknown and B: Ayden unknown/John known. Being part of group A meant that Ayden was included in the database and John was not, so:

- a) For traces left by Ayden participants received a match with Ayden Roberts

³ The design was tested in a pilot study with 64 university students. The results showed that the crime scene was multi interpretable and that the kind of information available influenced the interpretation of the scene.

- b) For traces left by John participants received the information that no match was found and the trace was left by unknown person X
- c) For traces left by Valerie or Steve participants received a match with Steve or Valerie.

Being part of group B meant that John was included in the database and Ayden was not, so the opposite counted:

- a) For traces left by Ayden participants received the information that no match was found and the trace was left by unknown person X
- b) For traces left by John participants received a match with John Campbell
- c) For traces left by Valerie or Steve participants received a match with Steve or Valerie.

The traces left by Ayden and John are left in a similar context and therefore equally important in the reconstruction of the crime. Figure 6.2 shows the traces left by both offenders.

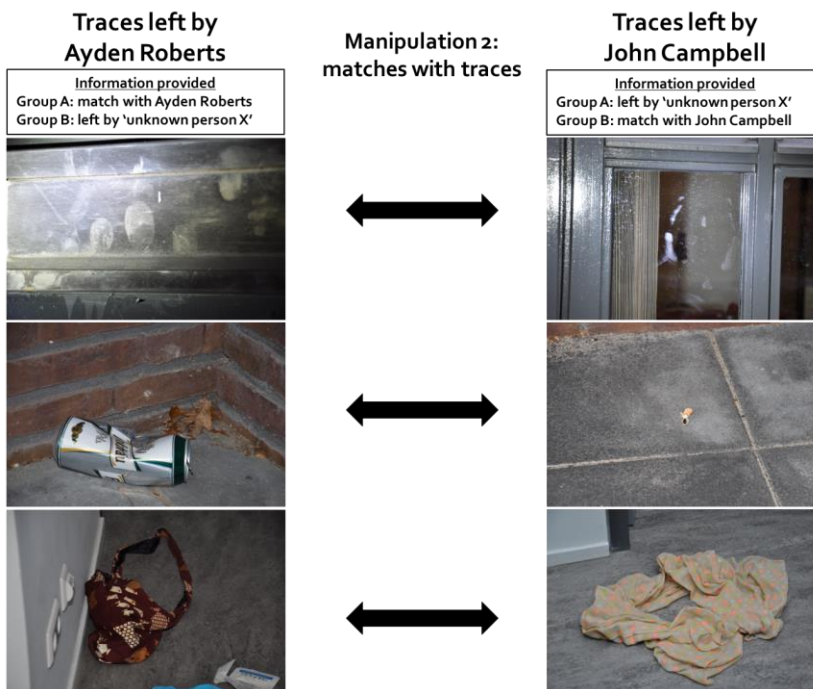


Figure 6.2: traces left by Ayden Roberts and John Campbell and kind of information provided to participants of group A and B.

A trace on the window left by John and fingerprints on the post flap left by Ayden were both found outside the property. They could have been left by the offender, but could also have been left by an innocent person. The same goes for a cigarette butt and a beer can found outside. Traces of Ayden were also found on a cloth shoulder bag inside the house. John left traces on a scarf also found inside the house. Both the shoulder bag and the scarf could have been murder weapons as participants received information that the victim had unusual red marks on her neck, suggesting strangulation. Traces left by either Steve or Valerie were similar for both groups. Manipulating the traces that provided a match with Ayden or John allowed us to investigate the influence of receiving a database-match on the value of a trace. Participants were randomly assigned to one of the conditions. The impact of getting an ID match on valuation of traces was measured by asking the participants to score the value of the traces on a 7-point Likert scale.

6.2.4.3 Q3: are the results replicable within a different police environment?

Factor III: country.

In order to study the robustness of the observed effects within a different police environment, the results obtained with English CSIs are compared with the results obtained with Dutch CSIs.

6.2.5 Participants

6.2.5.1 CSIs England. A total of 48 CSIs coming from eight police stations in four different regions in England participated in this study (see table 6.2).

6.2.5.2 CSIs Netherlands. A total of 65 CSIs coming from ten police regions in the Netherlands participated in this study. This sample will be further noted as Dutch CSIs. The results of a t-test show no significant differences between English and Dutch participants in age, time spent in the forensic department and experience with serious crimes. A chi-square analysis shows a significant difference in gender of the English and Dutch participants. The English sample contains significantly more female officers than the Dutch sample, $\chi^2(1)=10.74$, $p<.001$. To eliminate gender as cause for any differences between the two countries the influence of these factors on the results was tested. It had no influence on any of the results presented below. Table 6.2 shows the demographics of the participants.

Table 6.2: Participant demographics.

Characteristics			
English CSIs (N=48)		Dutch CSIs (N=65)	
Gender		Gender	
Female	28 (58%)	Female	18 (28%)
Male	20 (42%)	Male	47 (72%)
Age		Age	
<30	4 (8%)	<30	5 (8%)
30-39	14 (29%)	30-39	13 (20%)
40-49	16 (34%)	40-49	11 (17%)
50-59	6 (13%)	50-59	19 (29%)
>60	2 (4%)	>60	3 (5%)
Missing	6 (13%)	Missing	14 (22%)
Function		Function	
CSI	36 (75%)	Generalist	14 (21%)
Crime scene manager	10 (21%)	Senior CSI	40 (62%)
Other	2 (4%)	Forensic coordinator	9 (14%)
		Other	2 (3%)
Education		Education	
CSEs	3 (6%)	VMBO	3 (5%)
GCSEs	3 (6%)	HAVO / VWO	12 (18%)
A levels	11 (23%)	MBO	35 (54. %)
Undergraduate study	4 (8%)	HBO	9 (14%)
Undergraduate degree	18 (38%)	University	6 (9%)
Masters degree	7 (15%)		
Time spent in forensic department (years)		Time spent in forensic department (years)	
M=12, SD=7		M=12, SD=8	
<5	5 (11%)	<5	7 (11%)
5-9	11 (23%)	5-9	27 (42%)
10-14	16 (33%)	10-14	12 (18%)
15-19	8 (17%)	15-19	6 (9%)
20-24	5 (11%)	20-25	8 (12%)
>25	2 (4%)	>25	5 (8%)
Experience with serious crimes (years)		Experience with serious crimes (years)	
M=12, SD=8		M=11, SD=8	
(6% without experience in serious crimes)		(0% without experience in serious crimes)	

6.2.6 Procedure

The experiments for the CSIs were held at participants' police stations in England and in the Netherlands. All participants were briefed about the investigation, getting a leaflet with information about the research and an informed consent form. Participants were instructed to imagine that they had to conduct a crime scene investigation. It was explained that they had to investigate a virtual crime scene, provided on a laptop

computer and the experimenter demonstrated to the participants how to navigate the virtual environment. Witness statements and ID information were given both on the computer and on paper. There was not set a time limit.

The virtual crime scene was identical for all participants. At the start of the investigation all participants received the same investigative information as obtained from statements of witnesses. Subsequently, all participants were asked to process the crime scene as much as possible as if it were a real crime scene. After an initial round at the scene, the early ID information group received the identification information from the twelve pre-selected traces at the start of their investigation, and *all* participants received one more piece of investigative information. When satisfied with their visit of the crime scene, they were asked to write a scenario about the event that had taken place at the crime scene. They were required to write only one scenario, the most likely they could think of. This restriction was given to gain insights into the participants' first thoughts about the event that had taken place and to make these implicit thoughts explicit. Participants were allowed to return to the crime scene during the entire experiment. After writing their scenario, the late ID info group would receive the ID information about the pre-selected traces and participants were then offered the possibility to adjust their initial scenario. Furthermore, all participants had to score the importance of the twelve preselected traces analysed with rapid identification technologies, on a 7-point Likert Scale.

The produced scenarios were coded by the researcher. For each scenario, it was determined who was defined as the perpetrator and how many perpetrators were mentioned. In the few cases where the perpetrator was not straightforward, a second coder was consulted. The produced scenario is the dependent variable within the first part of the analyses. In order to answer the research question concerning the influence of the moment ID information is provided, the scenarios of group 1 (Late ID) will be divided into scenarios written at time 1, without ID info (T1: NO ID) and time 2 with late provided ID info (T2: Late ID). Three analyses will be conducted to compare the written scenarios:

- 1) Scenarios group 1 (T1: NO ID) – scenarios group 2 (Early ID)
- 2) Scenarios group 1 (T1: NO ID) – scenarios group 1 (T2: Late ID)
- 3) Scenarios group 1 (T2: Late ID) – scenarios group 2 (Early ID)

In the second part of the results, the scores on the 7-point Likert scale showing the perceived importance of the analysed traces function as dependent variable. Figure 6.3 shows the design of the study.

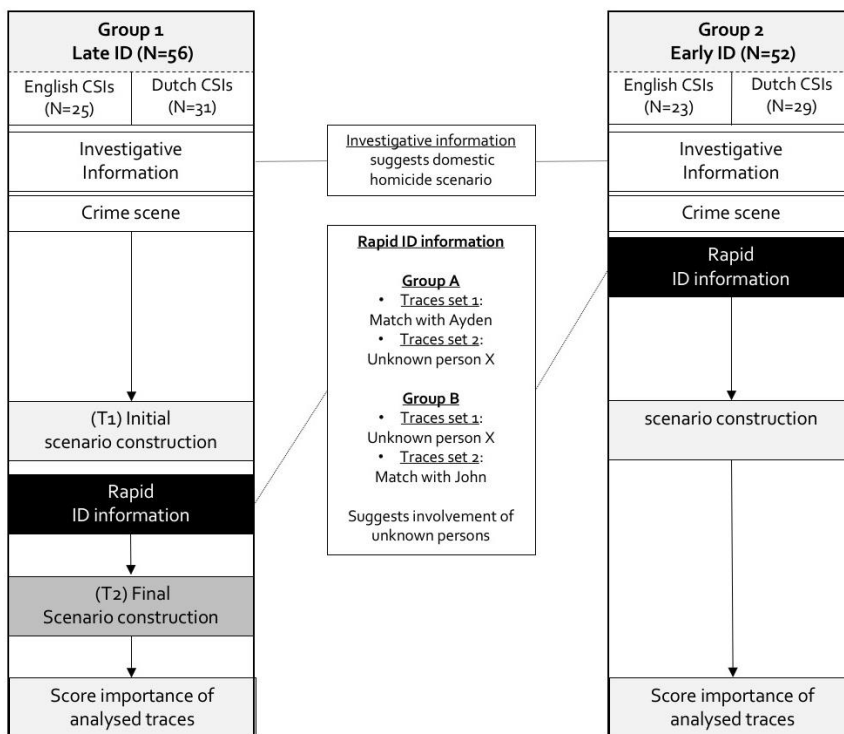


Figure 6.3: experimental design of the study. Research question 1 investigates the influence of the moment ID information is provided to the participants on the interpretation of the scene, research question 2 investigates the influence of the importance of a database-match on the value of a trace and research question 3 investigates the robustness of the observed effects with English CSIs by comparing them with the results of Dutch CSIs.

The experiment ended with an open question where participants were asked to describe what is, according to them, the goal of crime scene investigations. Participants could state multiple goals. All goals were coded and five categories were deduced from all goals mentioned (finding a suspect, reconstruction of the crime, assistance for investigation, collecting evidence and other). For each country, it was counted how many times a goal was stated.

6.3 Results

6.3.1 Goal of crime scene investigations according to CSIs

Figure 6.4 shows the goals mentioned by the English and Dutch CSIs. The results show that significantly more English CSIs mentioned finding a suspect as a goal of crime scene

investigations $\chi^2 (1) = 7.03$, $p < .01$, whereas Dutch CSIs mostly mentioned the reconstruction of the crime as the goal of crime scene investigations $\chi^2 (1) = 61.20$, $p < .001$.

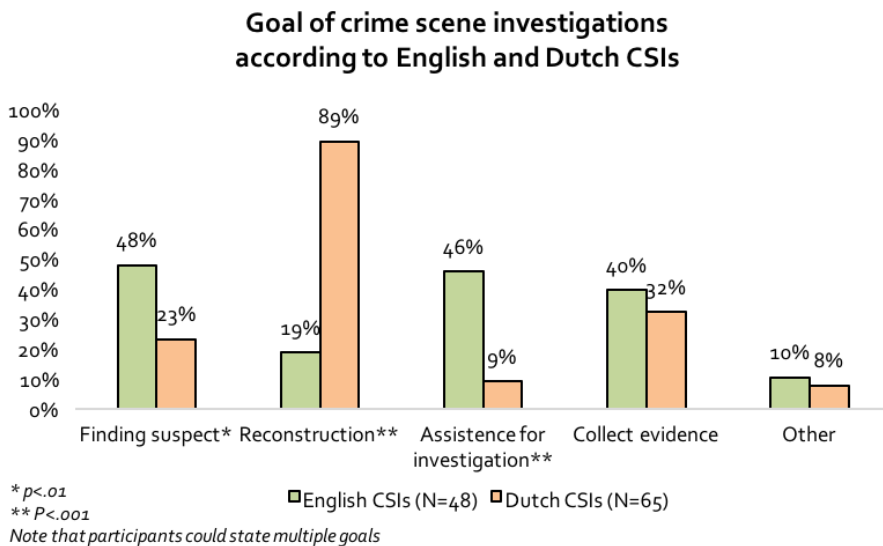


Figure 6.4: goals of crime scene investigations mentioned by English and Dutch CSIs.

Another goal stated by more English CSIs was to provide assistance for the police investigation $\chi^2 (1) = 19.04$, $p < .001$. Both English and Dutch CSIs mentioned the aim to collect evidence. Given the differences in the perceived goals of the CSIs in both countries, we will now further analyse their decisions regarding the use of rapid identification information.

6.3.2 Research question 1: Will timing of the ID information effect scenario formulation and is this effect generalizable to a different police environment (Hypothesis: ID info effects scenario formation)

6.3.2.1 The effect of getting early ID-info: Comparison of initial scenarios group 1 (T1: NO ID info) and group 2 (ID info). The initial scenarios written by participants of group 1 (T1: NO ID) and 2 (Early ID) for English and Dutch CSIs are shown in table 6.3. Unexpectedly, participants constructed scenarios in which neither the burglars nor the husband, but others such as Valeries' affair or another undefined person killed Valerie. In order to study the influence of ID information on the scenario construction it is important to understand what information (i.e. investigative information or ID information) was

more important for the participants. The affair scenarios could be based on both investigative or ID information. For that reason, the participants who wrote about an affair or the participants who did not define the killer, who wrote about a natural death/accident or made no decision are excluded from the analysis (England N=8; NL N=15). The ones describing a “Domestic homicide” and “Aggravated burglary” will be further analysed (England N=40; NL N=44).

Table 6.3: Classification of initial scenarios in terms of the offender written by English and Dutch CSIs of group 1 (T1: NO ID) and 2 (Early ID).

In the scenario written by the subject the crime was:	Group 1 (T1: NO ID)			Group 2 (Early ID)		
	English (N=25)	Dutch (N=31)	Total	English (N=23)	Dutch (N=29)	Total
<i>Domestic homicide (husband as offender)</i>	17	14	31	8	9	17
<i>Aggravated burglary</i>	4	7	11	11	14	25
<i>Valerie killed by person she was having an affair with or other person known to her</i>	2	4	6	2	1	3
<i>Killer not husband, not further defined</i>	0	3	3	1	1	2
<i>Natural death</i>	0	1	1	0	0	0
<i>No decision for 1 scenario</i>	2	2	4	1	4	5
Total	25	31	56	23	29	52

A logistic regression analysis was conducted to predict kind of scenario (indicator = 1 if a burglary was hypothesized, and 0 otherwise) using time of ID info (T1: No ID vs early ID) and country (0=England, 1=The Netherlands) as predictors. The results, also shown in table 6.4, show that timing of ID info is a significant predictor for the scenario that is written.

Table 6.4: results of logistic regression of “aggravated burglary scenario indicator” on country and time of ID-info as predictors.

	B	SE	95% CI for Odds Ratio		
			Lower	Odds Ratio	Upper
<i>Constant</i>	-1.48	0.56			
<i>Country</i>	0.75	0.72	0.52	2.13	8.78
<i>Time of ID info</i>	1.77*	0.72	1.41	5.84	24.17
<i>Country * Time of ID info</i>	-0.63	0.96	0.08	0.53	3.49
<i>Nagelkerke R²</i>	.163				

Note. Model $\chi^2(3)=10.892$, $p<.05$. * $p<.05$. ** $p<.01$

Participants in the group without ID info wrote more domestic homicide scenarios whereas participants of group Early ID more often wrote an aggravated burglary with homicide scenario. This effect surfaces both in England and the Netherlands, and as we see from the non-significance of the interaction term, is comparable in both countries. Figure 6.5 is a graphical representation of these results.

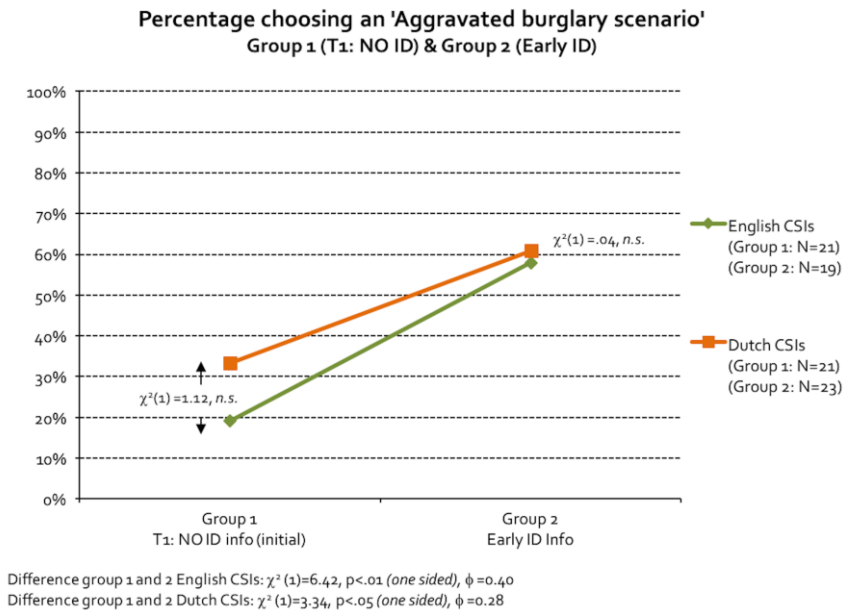


Figure 6.5: percentage English and Dutch CSIs choosing an aggravated burglary scenario in group 1 (T1: NO ID) and group 2 (Early ID).

Additionally, we looked into the number of offenders mentioned in the burglary / husband scenarios. None of the English and Dutch participants in group 1 (T1: NO ID) constructed a scenario with two offenders. In group 2 (Early ID) two English CSIs and eight Dutch CSIs constructed a scenario with two offenders. There is no significant difference in the number of English and Dutch CSIs describing a scenario with two offenders, but for Dutch CSIs, the difference between the two conditions (T1: NO ID and Early ID) is significant $\chi^2(1)=8.93$, $p<.01$. Hence, the ID information aided both English and Dutch CSIs in their construction of more accurate scenarios (an aggravated burglary), but English CSIs ignored the information of a possible second offender.

All participants had to report the certainty they felt about their scenarios on a scale of 1 to 7. The results of a t-test show no significant differences between English and Dutch CSIs in the two conditions. Table 6.5 shows the certainty scores for the scenarios.

Table 6.5: certainty scores for the scenarios given by English and Dutch CSIs.

<i>Certainty mean scores of scenarios on 7-point Likert scale</i>	English CSIs	Dutch CSIs	T-test
Group 1 (T1: NO ID)	4.2 (SD=1.2)	4.0 (SD=0.7)	t(40)=0,61, n.s.
Group 2 (Early ID info)	4.3 (SD=1.4)	3.5 (SD=1.6)	t(39)=1,61, n.s.

6.3.2.2 The effect of getting ID-info afterwards: Comparison of initial and final scenarios group 1 (within subjects analysis T1: NO ID info – T2: Late ID info)

After CSIs of group 1 (T1: NO ID) had written their scenario and further investigated the scene, they received ID information identical to the information that group 2 (Early ID) had been given earlier, and were given the opportunity to adjust their initial scenario.

The results show that 13 English CSIs changed from a domestic homicide to a burglary scenario. For the Dutch CSIs, this number is 9. Only one English CSI and four Dutch CSIs stayed with their domestic homicide scenario and none of all the CSIs changed their scenario from a burglary into a domestic homicide. One Dutch CSI who described a natural death and one CSI describing a burglary changed their scenario into a scenario where Valerie was killed by a known person. Three English CSIs and one Dutch CSI did not want to make a decision after the ID info was provided. Table 6.6 shows the classification of the final scenarios written by CSIs in group Late ID at T2.

Table 6.6: Classification of scenarios in terms of the offender written by English and Dutch CSIs of group Late ID info at time 2.

<i>In the scenario written by the subject the crime was:</i>	Group 1 (T1: NO ID)		Total
	English CSIs (N=24)	Dutch CSIs (N=31)	
<i>Domestic homicide (husband as offender)</i>	1	4	5
<i>Aggravated burglary</i>	11	18	29
<i>John / Ayden (crime type not described)</i>	8	7	15
<i>Valerie killed by person she was having an affair with or other person known to her</i>	1	1	2
<i>No decision for 1 scenario</i>	3	1	4
Total	24	31	55

Participants in the category known person or no decision were excluded from the analysis for the same reasons as mentioned before. The categories 'aggravated burglary' and 'John/Ayden (crime type not described)' are re-categorized into one category named

'homicide by John/Ayden'. Figure 6.6 shows the prevalence of initial (T1) and final scenarios (T2) for participants in group 1 (Late ID). Participants of group 2 (Early ID), who received the ID information at the start of the investigation, wrote only one scenario during the study therefore their initial and final scenarios are identical and only shown with a reference line.

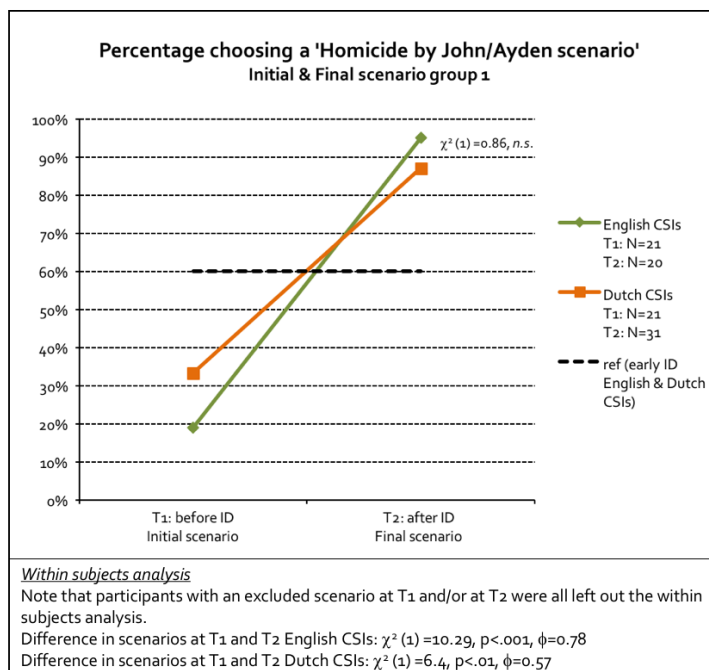


Figure 6.6: percentage English and Dutch CSIs choosing a homicide by John/Ayden scenario in group 1 at T1 without ID info and at T2 with ID info.

An overall comparison with an exact Mc Nemar test (Sachs, 1974) comparing the initial and final scenarios of all participants shows a significant influence of the ID information on the kind of scenario $\chi^2(1) = 19.17, p < .001$. Both English and Dutch CSIs adjusted their scenarios into a homicide by Ayden/John after they received the ID information. There was no difference between the final scenarios of English and Dutch CSIs in group 1 (Late ID) $\chi^2(1) = 0.86, n.s.$

An exact Mc Nemar test investigating the influence of information *within* group 1 for both countries determined that there was a significant difference in the proportion aggravated burglary scenarios before and after the provision of the ID information for both English CSIs $\chi^2(1) = 10.29, p < .001, \phi = 0.78$ and Dutch CSIs $\chi^2(1) = 6.4, p < .01, \phi = 0.57$.

This shows that providing the ID information led to more accurate scenarios, a homicide by Ayden/John, within group 1 (Late ID), both in England and The Netherlands. In order to investigate the influence of the ID information on the accurate number of offenders another exact Mc Nemar test was conducted. The results show no effect of the information for English CSIs, only one English CSI changed from one offender to two offenders. For Dutch CSIs the information did have an effect on the proportion CSIs stating the correct number of offenders $\chi^2(1) = 4.50, p < .025^4$. Seven CSIs changed the number of offenders to two offenders. The difference in the proportion stating the correct number of offenders between English and Dutch CSIs in group 1 (Late ID) is significant $\chi^2(1) = 4.56, p < .05$. So both countries adjusted their scenarios into a more accurate description of the actual crime after receiving ID information, but only Dutch CSIs linked the information to two offenders, the actual number of offenders that committed the crime.

The reported certainty of English ($M = 4.4$) and Dutch CSIs ($M = 4.8$) in group 1 (Late ID) for their final scenarios showed no significant difference $t(48) = -1.43, n.s.$.

6.3.2.3 Comparison scenarios group 1(T2: Late ID-final scenarios) & group 2 (early ID).

A logistic regression analysis was conducted to predict kind of scenario (indicator = 1 if a homicide by John/Ayden was hypothesized, and 0 otherwise) using time of ID info (T2: Late ID vs early ID) and country (0=England, 1=The Netherlands) as predictors. The results, also shown in table 6.7, show that only time of ID-info is a significant predictor for the scenario that is written. Participants in the group who received late ID info wrote more accurate scenarios than participants who received the identical information at the start of their investigation. This effect surfaces both in England and the Netherlands, and as we see from the non-significance of the interaction term, is comparable in both countries.

An overall comparison of the proportion stating the correct number of offenders in their scenarios shows that Dutch CSIs more often described a scenario with both offenders (39%) compared to English CSIs (8%), $\chi^2(1) = 11.51, p = .001$. Hence, both for English and Dutch CSIs the number of accurate scenarios increased when ID information was provided later in the investigation, after an initial scenario was constructed. In general, the ID info, early or late, made Dutch CSIs more aware of the possibility of two offenders whereas it did not raise awareness among English CSIs.

⁴ Note that participants with an excluded scenario at T1 and/or T2 were all left out this within subjects analysis.

Table 6.7: results of logistic regression of “aggravated burglary scenario indicator” on country and time of ID-info as predictors.

	B	SE	95% CI for Odds Ratio		
			Lower	Odds Ratio	Upper
<i>Constant</i>	2.94	1.03			
<i>Country</i>	-1.04	1.16	0.37	0.36	3.43
<i>Time of ID info</i>	-2.63*	1.13	0.01	0.07	0.66
<i>Country * Time of ID info</i>	1.16	1.32	0.24	3.18	42.19
<i>Nagelkerke R²</i>	.201				

Note. Model $\chi^2(3)=13.32$, $p<.01$. * $p<.05$. ** $p<.01$

6.3.3 Research question 2: do database-matches influence the valuation of traces and the reconstruction of the crime and is this effect generalizable to a different police environment?

As part of the data collection, all participants were asked to report the importance of the traces from which they received identification information on a 7-point Likert scale. Remember that group A received a match with Ayden for the traces left by Ayden and received “unknown person X” for the traces left by John. For group B it was vice versa. In order to investigate the effect of receiving a database match versus receiving a non-match, the difference between the mean scores on the traces left by John and Ayden was calculated and used as dependent variable. Table 6.8 shows the results of a factorial ANOVA with the effects of condition A or B, timing of ID info and country and any interaction effects on the perceived importance of traces left by John and Ayden.

Table 6.8: results of a factorial ANOVA.

	Sum of Squares	df	Mean square	F	Partial Eta Squared
<i>Condition A/B</i>	50.55	1	50.55	25.85**	.201
<i>Timing ID info</i>	0.54	1	0.54	0.28	.003
<i>Country</i>	0.84	1	0.84	0.43	.004
<i>Condition A/B * Country</i>	15.18	1	15.18	7.76*	.070
<i>Condition A/B * Timing ID info</i>	2.99	1	2.99	1.53	.015
<i>Country * Condition A/B * Timing ID info</i>	1.47	1	1.47	0.75	.007
<i>Error</i>	201.46	103	1.96		

Note. N=111. * $p<.05$ ** $p<.001$

The results show a significant effect of the interaction between condition A/B (match with either John or Ayden vs non-match) and country on the importance of the traces $F(1, 103) = 7.76, p < .01$ and hence imply different outcomes for English and Dutch CSIs. The effect of receiving a database-match on the importance of a trace is only manifested for English CSIs (see figure 6.7). The results show no interaction effect for condition A/B by timing of ID info $F(1, 103) = 1.53, n.s.$ and not for country by condition A/B by timing $F(1, 103) = 0.75, n.s.$, indicating that the effect of receiving a match does not differ between participants who received the ID information at the start of the experiment or after formulating a scenario. Simple main effects analysis yielded a main effect for condition A/B $F(1, 103) = 25.85, p < .001$, indicating a significant difference between group A ($M = -0.07, SD = 1.19$) and group B ($M = 1.18, SD = 1.63$). There was no main effect shown for country $F(1, 103) = 0.44, n.s.$ and timing $F(1, 103) = 0.28, n.s.$



Figure 6.7: mean difference between scores on all Ayden and John traces together for English and Dutch CSIs in group A and group B.

The reported scores on the traces left by Ayden and John are also analysed separately to investigate which traces were perceived as more important per country. Table 6.9 shows the mean scores of the individual traces that matched with either Ayden or John for English and Dutch CSIs in group A and B. The results of the replication study show different outcomes than the original study. English CSIs show an effect of receiving a database-match on the importance of traces for four out of six traces whereas Dutch CSIs

show no such effect at all. All six traces were scored equally important. This indicates that English CSIs show a higher focus on traces that showed a match with a known individual compared to traces found in a similar context but without a database-match. This finding corresponds with the finding that Dutch CSIs more often consider a scenario with two offenders. Hence, greater accuracy is accomplished by Dutch CSIs.

Table 6.9: mean relevance scores of the traces that matched with either John or Ayden for the participants in group A ("Ayden" - "unknown person") and B ("unknown person" - "John").

<i>Trace type (points to)</i>	ENGLISH CSIs			DUTCH CSIs		
	A: Ayden/ unknown	B: unknown/ John	t-test for difference P	A: Ayden/ unknown	B: unknown/ John	t-test for difference P
<i>Scarf (John)</i>	5.83	6.71	.007	6.03	6.18	n.s.
<i>Shoulder bag (Ayden)</i>	6.13	4.63	.001	5.75	5.32	n.s.
<i>Cigarette butt (John)</i>	4.78	5.17	n.s.	4.75	5.45	n.s.
<i>Beer can (Ayden)</i>	5.57	4.25	.034	4.66	4.83	n.s.
<i>Window trace (John)</i>	5.09	5.83	n.s.	5.30	5.94	n.s.
<i>Finger mark post flap (Ayden)</i>	5.78	4.29	.009	4.75	4.61	n.s.

Scores in conditions where participants get a name returned are highlighted in grey

*Notice that for Dutch CSIs in general traces left by John were scored higher compared to traces left by Ayden.⁵ However, this has no influence on the comparison of scores within traces.

6.4 Discussion

This replication study confirms the robustness of the earlier finding showing that identification information influences the interpretation of a crime scene, and more specifically, that the extent to what ID information is used by CSIs depends on the moment this information is provided during the crime scene investigation. This effect is shown for both English CSIs, whose aim is to find a suspect and who operate in an efficiency based police policy, as for Dutch CSIs, whose aim is to reconstruct the event and who operate within a context with more emphasis on precaution and less on efficiency. Both English and Dutch CSIs changed their initial interpretation of the crime

⁵ Due to higher mean scores for John traces it was not possible to conduct a within-subjects analysis.

scene based on identification information obtained with rapid trace analysis when this information was provided after a provisional scenario was constructed, instead of interpreting this new incoming information in line with their provisional scenario. This kind of forensic information seems to be ultimately used when an initial scenario can be tested with it.

As discussed by Innes (2003) forensic evidence is routinely attributed the status of providing objective proof within investigations because of the scientific analysis of physical traces and the analysis of traces often cause alterations in the details of the scenario that is being constructed. Our findings correspond with his statement as the trace information in our study determines the kind of scenario that is being constructed by CSIs. This may be due to the fact that, as Innes (2003) suggests, trace material is often held to be more objective than alternative sources of evidence. Research of Granhag, Ask, & Rebelius (2008) also showed that police trainees who were asked to read a homicide case and then received a piece of evidence considered DNA evidence compared to witness evidence more reliable. However, this objectivity effect is to a lesser degree shown when this information is provided at the start of the investigation. It seems that, in general, ID information is better interpretable when it can be used to test an initially constructed scenario than when a scenario has to be constructed based on this and other information, possibly due to the limitations on the amount of information people are able to receive, process and remember at the same time (De Gruijter et al., 2017; Miller, 1956).

Besides the similarities between the countries, the selective attention of English CSIs regarding the perceived importance of traces found in the previous study (De Gruijter et al., 2017), seems not to be a common police decision making strategy. English CSIs were more biased towards obtained identifications of individuals in the database than Dutch CSIs. Traces found in a similar context, but without a match in the database, were perceived as less important by the English CSIs than traces left by a known offender, whereas Dutch CSIs did not distinguish between these traces. They perceived traces left by an individual that matched the database and traces left by an unknown person as equally important.

The difference in the interpretation of information is also reflected in the finding that Dutch CSIs more often than English CSIs considered scenarios with two offenders, which was in accordance with the actual number of offenders. Instead of common police decision making, there seems to be an additional factor that influences the interpretation of this ID information. It appears that Dutch CSIs were more focussed on the relation of the trace with the crime, while English CSIs were more focussed on the information provided by the trace, and more specifically on the database-match. The results showing differences in the perceived goal of crime scene investigations confirm this idea.

According to English CSIs, the aim is to find a suspect, whereas Dutch CSIs see the investigation as a means to reconstruct the event. A previous study with Dutch CSIs demonstrated that CSIs conducting their investigation were focussed on finding offender traces (De Gruijter et al., 2016b). These present results suggest that this focus does not imply that database-matches are perceived as more important, but that, in a case where an existing idea is not contradicted by information that a trace is left by the victim, the assumed relation between a trace and the crime is more important than the information coming from the trace.

Granhag et al. (2011) demonstrated that unconscious activation of different goals influenced the way criminal evidence was processed by criminal investigators. Exposure to norms associated with efficiency led to a reduction of the depth of investigators' processing of the evidence. The present results could be explained in a similar way. English CSIs may be (unconsciously) influenced by the applicable efficiency norms within their police department whereas Dutch CSIs behaviour may be influenced by the high emphasis on thoroughness and the prevention of tunnel vision.

The English way of interpreting ID information is very efficient as identifications based on database-matches provide direct investigative opportunities, whereas traces that cannot be identified do not immediately provide lines of inquiry. However, this way of information processing can also lead to tunnel vision. Generally, using shortcuts and narrowing your focus contributes to efficient decision making as relevant information needs to be distinguished from irrelevant information (Gigerenzer & Brighton, 2009; Gigerenzer et al., 1999). Focus can also be beneficial during crime investigations (Liedenbaum et al., 2015; Snook & Cullen, 2008), but as demonstrated in this study, it can also lead to blindness for important information. In the worst case, such tunnel vision can lead to miscarriages of justice. In this study, English CSIs, contrary to Dutch CSIs, did not consider scenarios with two offenders. Although both police communities pay attention to the risks of bias within police investigations (ACPO, 2006; Forensic Science Regulator, 2015; Jones et al., 2008; Liedenbaum et al., 2015), the high emphasis on efficiency and effectiveness within the English policing culture may contribute to their more focussed way of decision making. Participants in our study were asked to form only one scenario in a very early phase of the investigation, so it would be useful to investigate the ongoing process of the police investigation.

Moreover, both English and Dutch CSIs are influenced by ID information, but overall, English CSIs seem to be influenced even more in their interpretation of the crime scene by the information provided to them. Dutch CSIs show more variation within the conditions and seem to hold a more nuanced approach, whereas English CSIs show less variation. This is in line with a strong protocolled environment with more emphasis on

efficiency and less on the risks of the multi-interpretability of information. Groenendaal & Helsloot (2014) discuss the polarity between efficiency and precaution and believe the Dutch policing model should be more aware of the tension between efficiency and precaution. They discuss that the efficiency of criminal investigations has lessened since the Criminal Investigation and Prosecution Reinforcement Programme has been implemented. In this study, Dutch CSIs made more accurate decisions than their English colleagues by not dismissing the traces without a direct link with an individual. However, it is important to realize that in most cases the more focussed decisions of English CSIs will also lead to correct results.

It is difficult to determine what the most efficient balance between thoroughness and efficiency should be. Especially within the criminal justice system, it is important to deliver high quality investigations as decisions are made regarding the human rights of people. The common objective of both adversarial and inquisitorial models of criminal justice is to convict the guilty and acquit the innocent (Creton & Pakes, 2013). Multiple miscarriages of justice have shown the importance of thoroughness as well as scientific studies in which several biases in different phases of an investigation have been demonstrated (Ask & Granhag, 2005; Dror et al., 2005; Eerland & Rassin, 2012; O'Brien, 2009; Van den Eeden, De Poot, & Van Koppen, 2016). Based on the results of this study, we are led to the conclusion that identification information is of significance for the interpretation of the crime scene. Indeed, rapid identification information can ease decision making at the crime scene as different sources of traces can be distinguished rapidly and suspects can be quickly identified. Hence, efficiency of investigations will increase. But again, applying shortcuts can also cause errors when important information is overlooked.

This replication study shows its value by showing the validity of the finding that timing of ID information is of influence on the extent to which it is used. This kind of forensic information seems to be ultimately used when an initial scenario can be tested with it. This study also shows its value by showing the existence of dissimilarities in the way information is interpreted between two different police environments. We are led to the conclusion that research findings regarding the interpretation of forensic information obtained in one country are not simply generalizable to other countries. Fahsing & Ask (2016) are one of the few who conducted a comparative study between English and Norwegian detectives in which they addressed the effects of professional experience on the quality of detectives' decision making. Their study also demonstrated differences between these two countries. Although several decision processes and their associated risks in police investigations are demonstrated in multiple studies conducted with police detectives from different countries (Ask & Granhag, 2005; Dror, Charlton, & Péron, 2006;

Eerland & Rassin, 2012; Meissner & Kassin, 2002) it may be wise to replicate studies regarding police decision making more often over different nations with diverging police cultures and criminal justice models.

6.4.1 Limitations

This is one of the first studies investigating the generalisability of CSI decision making in different police environments and one of the first considering the influence of different policing cultures on the decisions being made. This study certainly provides some important insights, but also has its limitations. First of all, the robustness of the findings is only tested with one experiment within two different police environments. In order to further test the robustness of the findings, other aspects such as the influence of different crime scenes, different traces or different identification information should also be tested. Also, the sample sizes were quite small which makes it difficult to demonstrate differences between conditions. The absence of significant differences in the valuation of traces by Dutch CSIs could also be due to the small sample sizes and low power. More research in this field is necessary to further investigate the influence of database-matches on the value of traces.

Another clear limitation is the computerized crime scene and the controlled setting in which participants had to investigate the crime scene, which is of course not representative of CSIs actual work (see also (De Gruijter et al., 2017). All participants were asked to what extent it had been possible to properly answer the questions on the basis of the computerized scene and the photos, using a 7-point Likert scale. English CSIs scored a 3.5 ($SD=1.3$), showing that they had some difficulty interpreting the artificial scene as a real crime scene. The score of the Dutch CSIs, 4.3 ($SD=1.4$), shows that they were better able to interpret the scene ($t(110)=-3.46$, $p<.001$). This difference may have had an effect on the interpretation of the crime scene and its traces, and thus on the findings. However, there is no reason to believe that Dutch CSIs have a better understanding of rapid identification technologies as these technologies are still not introduced within the real world. Also, previous participation of part of the Dutch CSI sample showed no influence on the results. Dutch CSIs may have been more aware of their participation in this study. More studies need to be conducted to further investigate any differences in CSI decision making.

A final important limitation is the possibility of other relevant influences on the decision making which we may have neglected in our paper. We can only speculate about the cause for the higher accuracy of Dutch CSIs as no research has been conducted in this area and the relationship with a police culture and its goals is difficult to determine. We

cannot neglect the fact however, that the English and Dutch CSIs showed differences in their decision making and this deserves more attention in research.

6.4.2 Conclusion

Our study confirms previous findings that, regardless of police culture and the aim of CSIs, the moment that identification information is provided significantly influences to what extent this information is used. We have also demonstrated that findings regarding CSI decision making cannot simply be generalised over different police environments as common police behaviour. Compared to their Dutch equivalents, English CSIs showed to be more prone to bias towards traces that produced database-matches compared to similar traces not providing a match. Dutch CSIs seemed to be more focussed on the relation of the trace with the crime, while English CSIs look more focussed on the information provided by the trace, and more specifically on a database-match. The results showing differences in the perceived goal of crime scene investigations, reconstructing the crime or finding a suspect, confirm this idea. These findings raise the question whether too much emphasis on efficiency goes at the expense of the quality of an investigation. Our single cross-national study is not able to answer this question, but shows a need for more controlled research in this area. Given the robustness of the finding showing the significant influence of the timing of identification information, this should already receive attention when rapid identification technologies will be introduced in the real world.